

Claims

1. Arrangement for controlling transmission and/or reception of signals in a radio communications system, comprising
5 transceiving means (TX,RX) each connected to one element of an array of antenna elements (#1...#n), wherein at least one of said transceiving means (TX,RX) is additionally connected to a calibration antenna for transmitting and/or receiving test signals to and/or from said antenna elements (#1...#n),
10 at least one calibration processor for determining variations of said test signals in said transceiving means (TX,RX), and a beamforming processor for taking into account the determined variations for beamforming and/or determination of direction of arrival of respectively transmitted and received radio signals by said antenna elements (#1...#n).
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2. Arrangement according to claim 1, wherein a transmission gap in a time frame of a TDD system is used for the transmission of said test signals for determining
20 variations in the calibration processor.
3. Arrangement according to claim 1 or 2, wherein in the said at least one transceiving means (TX,RX) connected to the calibration antenna test signals are switched via a
25 switch (S) to the calibration antenna in a calibration process.
4. Arrangement according to one of the preceding claims, wherein
30 said calibration processor is realised within the beamforming processor.

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5. Arrangement according to one of the preceding claims, comprising

at least one lookup table for storing the determined variations of the individual transceiving means (TX,RX).

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6. Arrangement according to one of the preceding claims, wherein

at least two calibration processors, each determining variations for a different radio frequency, are connected to said

10 transceiving means (TX,RX) via a base band multiplexer.

7. Base station (BS) of a radio communication system, comprising an arrangement according to one of the preceding claim.

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8. Method for controlling transmission and/or reception of signals in a radio communication apparatus (BS), the radio communication apparatus (BS) comprising transceiving means (TX,RX) each connected to one element of an array of antenna

20 elements (#1...#n), at least one of the transceiving means (TX,RX) being additionally connected to a calibration antenna, wherein

in a receiver calibration procedure, test signals are generated, fed to the at least one transceiving means (TX,RX) connected to the calibration antenna, transmitted via the calibration antenna and received by said antenna elements

25 (#1...#n) and corresponding transceiving means (TX,RX), and/or

30 in a transmitter calibration procedure, test signals are generated, fed to the transceiving means (TX,RX), transmitted via said antenna elements (#1...#n), and received by said calibration antenna and said one of the transceiving means (TX,RX),

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variations of the test signals in the transceiving means
(TX,RX) are determined in at least one calibration processor,
and
the determined variations are taken into account for beamfor-
5 ming and/or determination of direction of arrival of respec-
tively transmitted and received radio signals by said antenna
elements (#1...#n).

9. Method according to claim 8, wherein
10 variations of the test signals are determined consecutively
for different radio frequencies.

10. Method according to claim 8 or 9, wherein
variations of the test signals are determined concurrently
15 for different radio frequencies, thereby using individual
calibration processors for the different radio frequencies.

11. Method according to one of the preceding claims 8 to 10,
wherein
20 transfer functions of the transmitting and/or receiving paths
are determined in the calibration processor.

12. Method according to one of the preceding claims 8 to 11,
wherein
25 the calibration processor determines a maximum of a phase and
amplitude difference of a coupling coefficient.

13. Method for controlling transmission and/or reception of
signals in a radio communication apparatus (BS), the radio
30 communication apparatus (BS) comprising transceiving means
(TX,RX) each connected to one of an array of antenna elements
(#1...#n) and calibration transceiving means connected to a
calibration antenna, wherein

in a receiver calibration procedure, test signals are generated, fed to the calibration antenna, transmitted via the calibration antenna and received by said antenna elements (#1...#n) and corresponding transceiving means (TX,RX),
5 and/or in a transmitter calibration procedure, test signals are generated, fed to the transceiving means (TX,RX), transmitted via said antenna elements (#1...#n), and received by said calibration antenna and said calibration transceiving means (TX,RX), wherein a transmission gap in a time frame is
10 used for the transmission and reception of said test signals, variations of the test signals in the transceiving means (TX,RX) are determined in at least one calibration processor, and
the determined variations are taken into account for beamforming and/or determination of direction of arrival of respectively transmitted and received radio signals by said antenna
15 elements (#1...#n).